Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

LIBRARY
RECEIVED
★ JUL 14 1942 ★
U.S. Department of Agriculture

THE PLANT DISEASE REPORTER

Issued by

THE PLANT DISEASE SURVEY, DIVISION OF MYCOLOGY AND DISEASE SURVEY
BUREAU OF PLANT INDUSTRY, UNITED STATES DEPARTMENT OF AGRICULTURE

SUPPLEMENT 136

A SURVEY OF THE GENUS LYCOPERSICON FOR RESISTANCE TO THE IMPORTANT TOMATO DISEASES OCCURRING IN OHIO AND INDIANA

June 15, 1942

The Plant Disease Reporter is issued as a service to plant pathologists throughout the United States. It contains reports, summaries, observations, and comments submitted voluntarily by qualified observers. These reports often are in the form of suggestions, queries, and opinions, frequently purely tentative, offered for consideration or discussion rather than as matters of established fact. In accepting and publishing this material the Division of Mycology and Disease Survey serves merely as an informational clearing house. It does not assume responsibility for the subject matter.

A SURVEY OF THE GENUS LYCOPERSICON FOR RESISTANCE TO THE IMPORTANT TOMATO DISEASES OCCURRING IN OHIO AND INDIANA

By L. J. Alexander, Associate, Department of Botany and Plant Pathology, Ohio Agricultural Experiment Station, Wooster, Ohio, Ralph E. Lincoln, Associate in Botany, and Vedder Wright, formerly Assistant in Botany, Indiana Agricultural Experiment Station, Lafayette, Indiana.

Plant Disease Reporter
Supplement 136 June 15, 1942

During the past several years, the Division of Plant Exploration and Introduction, Bureau of Plant Industry, United States Department of Agriculture, has been making a world-wide collection of the genus Lycopersicon, especially from South and Central America where the genus is thought to be indigenous, in order to obtain new sources of genetic material for improving the domestic tomato. Seed of these introductions has been multiplied and made available to workers in the United States Department of Agriculture and the State experiment stations.

Certain of these introductions have already been used as a source of disease resistance in the development of new varieties of tomatoes; however, they will be most useful only after they have been surveyed for desirable characters under varied conditions. The publication of such surveys should greatly reduce the amount of work and expense involved in tomato breeding programs using these collections.

At the Ohio and Indiana Agricultural Experiment Stations, large numbers of these introductions have been tested for disease reaction in an effort to locate sources of resistant germ plasm for use in tomato breeding programs. Tests have been made for resistance to practically all the important tomato diseases that occur in the North-Central region of the United States. These data are brought together in this paper.

Methods

The 448 tomato introductions tested were received during the period 1935 to 1940. Since the number of seeds received from the original sources was small, usually no tests were made until the seed could be field-multiplied. In saving seed, no attempt was made to select types, but the collection was sampled by saving fruit from each plant in a plot. Since the blossoms were not bagged, a slight amount of crossing may have taken place.

A classification of those plants used for seed multiplication was made on the basis of fruit and leaf characters, and in the tables of this publication, the introductions are grouped on the basis of these characters. Muller (7) divided the genus Lycopersicon into 6 species, and his classification has been followed. Muller also classified a large number of these introductions, and those identified by him as belonging in the group where placed are indicated in the tables by an asterisk.

The species L. esculentum contained a number of different types that were separated as shown in Table 5. In many instances, it was not possible by macroscopic examination to distinguish between certain of the small L. esculentum introductions and L. pimpinellifolium, consequently, a group was included in the L. esculentum types with the heading "probable crosses between L. esculentum and L. pimpinellifolium." It is likely that some of the introductions listed under this heading should be considered as L. pimpinellifolium or small L. esculentum types. The remainder were probably chance crosses between the 2 species.

Seeds of introductions to be tested for resistance to fusarium wilt, (Fusarium bulbigenum var. lycopersici Wr. & Reinking), were sown in a sand and peat moss mixture. Several isolates of the Fusarium were mixed to make up the inoculum. Plants about 2 weeks old were inoculated by dipping the roots into a spore and mycelial suspension, and were then transplanted into beds or flats. Soil temperatures in the glasshouse were maintained between 75 and 80° F.; and the air temperature as near 70° F. as possible. Disease readings usually were made 5 or 6 weeks after inoculation. Certain lots were transplanted into the field for further observation and the additional data secured combined with those obtained in the greenhouse. Three classes were used to record the data in Ohio: plants with no external symptoms and no discolored vascular tissue on cross section were considered healthy; plants with external symptoms or darkened vascular tissue were listed as diseased; plants dying before notes were taken were listed as dead. In the Indiana data, 2 classes were used: plants not showing external symptoms or discolored vascular tissue at the ground line were considered healthy; all others, diseased.

Leaf mold tests were made by spraying spore suspensions of Cladosporium fulvum Cke. onto potted plants with from 4 to 6 true leaves. The method was essentially that described by Alexander (1,3). Diseased leaves used as a source of inoculum for the "Globelle" strain were collected from northern Ohio, for the "Globe" strain from southern Ohio; in each case the strain was verified by cross-inoculations.

Resistance to septoria leaf blight, Septoria lycopersici Speg., and to alternaria leaf blight, Alternaria solani (Ell. & Mart.) Jones & Grout, was determined by field observations. In addition, certain resistant plants were tested further by artificial inoculations in the glasshouse. Ohio observations were dependent on natural infection. In Indiana, natural infection was supplemented with artificial inoculations in separate field plots. Four classes were used to record resistance to these diseases: Healthy, indicated by (0), showed no visible lesions and no defoliation from disease; Very resistant, (1), showed some small lesions but no defoliation; Moderately resistant, (2), intermediate between very resistant and susceptible and showed some defoliation; Susceptible, (3) appeared to offer little or no resistance. Certain introductions were not uniform for resistance or susceptibility; these are designated as heterogeneous (H). The relative resistance of these classes has been described by Wright and Lincoln (11).

Observations on resistance to common tobacco mosaic virus, Marmor tabaci var. vulgare Holmes, were made in Ohio from natural field infection. In Indiana, artificial inoculations were made on plants 3 weeks

after transplanting from the seed flat. No attempt was made to classify the severity of the disease, and only its presence or absence was recorded. Introductions appearing healthy and free from the virus were designated (O); those susceptible to this virus, (S); introductions not uniform in their reaction were indicated as heterogeneous (H). Plants from certain introductions appeared healthy and were tested for the presence of the virus by the local lesion method on Datura stramonium or Nicotiana glutinosa as described by Price (9). Results of these tests are shown in Table 2.

Tests for resistance to bacterial canker, Phytomonas michiganensis (E.F.S.) Bergey et al., were made during the winter on plants that had been potted 7 to 8 weeks, inoculated by injection of a few drops of an 18 to 24-hour-old nutrient broth culture into the stems with a hypodermic needle. Readings were made 5 weeks afterward. The plants were divided into 3 classes, (1) healthy, (2) living plants showing internal discoloration usually accompanied by wilting and therefore considered diseased, and (3) dead plants.1/

Resistance of the foliage to bacterial spot, Phytomonas vesicatoria (Doidge) Bergey et al., was tested in the greenhouse about 4 weeks after transplanting into flats. Artificial inoculations were made under favorable temperature and humidity conditions. Three ratings were made on the basis of the appearance of the lesions: resistant, indicated by (1), with very small lesions; intermediate, (2), with larger lesions, usually averaging about 1 mm. in diameter and often corky in appearance; and susceptible, (3) with much larger lesions and apparently possessing no resistance.

Tests for bacterial wilt resistance, Phytomonas solanacearum (E.F.S.) Bergey et al., were made on 7 plants from each introduction grown in the glasshouse in flats during the summer of 1940. Inoculations were made by chopping up diseased plants obtained from the field, flooding the flats with this suspension, and then cutting the roots between alternate rows of plants. This inoculation was repeated twice with diseased plants removed from the flat used for inoculum. At the end of the test period live plants were pulled, and the stems split open at the ground line. If the stem was discolored, the plant was considered diseased. Cuttings from healthy plants developed into good plants and matured fruit. Each plant saved was given a 10-plant progeny test in the summer of 1941. In cases where all plants of a given progeny were susceptible, the original plant was considered as an escape.

Results and Discussion

The observations on the resistance of the introductions tested to the various pathogens are given in Tables 1 to 5. The 5 species of Lycopersicon tested are grouped in separate tables.

1/ The authors are indebted to R. C. Thomas, Associate, Department of Botany and Plant Pathology, Ohio Agricultural Experiment Station, for making these inoculations and taking the records.

Of the species tested, L. peruvianum apparently offered the highest type of resistance to the diseases studied. It appeared to be particularly valuable as a source of resistance to tobacco mosaic and to leaf mold, being almost uniformly resistant to both. In addition, certain introductions of L. peruvianum were resistant to fusarium wilt, septoria and alternaria leaf blights, and bacterial spot. On the other hand, this species seemed to have little resistance to bacterial canker or bacterial wilt. L. peruvianum is considered rather difficult to hybridize with red-fruited types, but the cross L. pimpinellifolium X L. peruvianum (P.I. 126431) has been made at the Indiana Station, and fertile F_2 seed has been obtained there. Holmes (5) and Virgin (10) obtained fertile crosses between L. peruvianum and red-fruited forms of the domestic species. A cross with L. peruvianum var. humifusum (P. I. 127829) has been attempted several hundred times at both the Ohio and Indiana Stations but as yet has not been successful.

L. hirsutum was tested adequately only for resistance to the defoliation diseases and to tobacco mosaic. The species showed high resistance to these diseases, approaching immunity in many cases. With the exception of the variety glabratum, this species flowered but rarely fruited in the field in Ohio or Indiana. In view of the apparent association between fruitfulness and severity of defoliation in commercial varieties, it might be expected that this resistance was partially due to lateness and non-fruitfulness. However, artificial inoculations under conditions of humidity and temperature favorable for disease development indicated that this was not the cause. It is encouraging to note that certain other stations are using L. hirsutum as a source of resistance to leaf defoliation diseases. Locke (6) has published recently on the resistance of segregates of L. hirsutum X L. esculentum crosses to septoria and alternaria leaf blights. An attempt is being made at the Ohio and Indiana Stations to transfer by hybridization the resistance of certain L. hirsutum introductions to commercial types of tomato. Porte et al. (8) have also reported hybridization for this purpose. The authors experienced little difficulty in obtaining fertile hybrids of this species with L. esculentum.

L. glandulosum has not been tested adequately for disease reaction, since it fruits poorly or not at all. For this reason, introductions of the species have not been available for routine testing work. From limited observations, it did not appear to possess any resistance to the diseases studied.

L. pimpinellifolium contained resistance to fusarium wilt and leaf mold. Certain introductions also appeared to have some resistance to septoria, as indicated by small lesion size and delayed and reduced sporulation. Several of the introductions, although susceptible to the tobacco mosaic virus, showed very mild symptoms of the disease. L. pimpinellifolium is red-fruited, readily hybridizes with varieties of the domestic species, and has been used widely as a source of disease resistance. Since Bohn and Tucker (4) reported P.I. 79532 to be "immune" from fusarium wilt, it has been used widely as the source of wilt-resistance in several breeding programs. The Ohio data indicated that the resistance of this introduction has not been maintained to the Ohio strains of Fusarium. A comparison of the Ohio and Indiana data shows

that although in general the resistance of an introduction is the same in the 2 areas, an outstanding exception to this generalization occurred in P.I. 79532. This species has been used by Alexander (1) as a source of leaf-mold-resistance in the glasshouse tomato. Some of the introductions appear to be homozygous for resistance to both the known strains of this organism.

L. esculentum, with certain exceptions, namely P.I. 126914, 126915, 126950, 128621, 129027, 129029, 129165, and 126156, contained little of value to a disease-resistance breeding program. The exceptions were wilt-resistant and may be valuable for this character. Certain other introductions may have a slight degree of resistance to septoria leaf blight as evidenced by somewhat less defoliation. However, Alexander (2) tested 180 commercial varieties of this species under controlled conditions without finding evidence of resistance.

Tests were made to determine resistance to ripe fruit rot caused by Colletotrichum phomoides (Sacc.) Chester. Wide differences were indicated by the incidence of fruit rot in the field. L. esculentum, P.I. 129123 and 129125, are known to be extremely susceptible. At the Indiana Station during the summer of 1941, more than 50% of the fruits of these introductions had one or more lesions, but there was less than 5% infection on fruit of most other introductions and of commercial varieties. These 2 introductions may have value as susceptible checks in a breeding program. Attempts also were made to determine resistance by artificial inoculation. Because of the fleshy, perishable nature of a tomato fruit, this proved a difficult task. Nevertheless, there were marked differences in the rate at which fruits broke down and in the rate of increase of lesion size. Fruit size is a variable which has not been satisfactorily analyzed in its relation to resistance. The species L. esculentum and L. pimpinellifolium P. I. 117897, 123538, 124165, 126417, 126934, 126939, 128227, 128233, 128237, 128446, 128623, 129054, 129065, 129119, and 129932 appeared to possess resistance, as indicated by rapidity of fruit breakdown and rate of increase in lesion size. Much more work needs to be done to locate resistance to this disease, but it is believed that marked differences in resistance are present in the collection.

Fruit cracking is important in influencing the amount of loss by fruit rot, as well as in decreasing the commercial value of the fruit. It was observed that some introductions typically cracked radially, while others cracked concentrically. The species L. esculentum P. I. 118327, 125831, 126412, 126452, and 126815 appeared to be extremely susceptible and to have value as susceptible check material. During the summer of 1941 L. esculentum and L. pimpinellifolium P.I. 91458, 92864, 92865, 93302, 118407, 118611, 120267, 124133, 126929, 126946, 127795, 129108, 129109, 129110, 129119, 129120, and 129881 produced practically no cracked fruit even though allowed to hang to extreme maturity. Certain of these introductions were under observation for more than one season and may be considered to have some degree of resistance to cracking.

An observation regarding possible resistance of L. hirsutum var. glabratum P.I. 134417 to red spider is of interest and probably worth recording. This introduction showed no injury during a red spider infestation that killed L. glandulosum P.I. 126435, 126439, and 126949, and essentially defoliated L. peruvianum P.I. 126926, 126928, 126929, 126945,

and 127829, and several introductions each of L. pimpinellifolium and L. esculentum. Some red spiders were observed on the leaves of P.I. 134417, but, since the foliage of plants of this introduction was intermingled with the foliage of plants of severely infested introductions, it is not known whether these individuals had become established or were migrants. The other L. hirsutum introductions, 126445, 126446, and 126936, also appeared to possess some resistance.

The survey reported here shows that resistance to practically all the important tomato diseases occurs in the genus Lycopersicon. It is reasonable to expect that in time, such resistance can be transferred to commercial tomato varieties, since representatives of most of the wild species possessing resistance have been crossed with varieties of the domestic species.

Since most crosses between the green-fruited species, L. peruvianum, L. hirsutum, and L. glandulosum, and the red-fruited species, L. esculentum and L. pimpinellifolium, are obtained with more or less difficulty, certain techniques may prove of value in transferring the genes for disease resistance to commercial types. Crosses have been obtained between red-fruited species and both L. hirsutum and L. peruvianum. Additional crosses with introductions of the green-fruited species might be obtained more easily if segregates from the crosses already obtained were used instead of some of the standard varieties of L. esculentum. Segregates from this "bridging-cross" might then be expected to cross more readily with commercial varieties. Also, consideration might be given to the feasibility of crossing 2 desirable introductions of a given species, obtaining a segregate that combined the desired features of both parents, then putting all the effort necessary into obtaining the cross of this segregate with commercial types.

Because of host and parasite variation, a given introduction might show a different reaction to a specific organism from that reported in this survey in some cases. Some introductions used in this study were observed to be heterogeneous for disease reaction; consequently, it is possible that with subsequent seed multiplication, different genotypes may appear. However, since the tomato is largely self-pollinated, this source of variation should be small. The pathogens also may vary in different localities. An example of pathogenic variation is indicated by the differences in the results obtained from the Ohio and Indiana fusarium-wilt tests. It is to be expected that pathogenic variation will be found in other organisms as well, since the discovery of resistant plants furnishes a differential host on which variants may develop and be selected.

Summary

1. Four hundred forty-eight tomato introductions of the Division of Plant Exploration and Introduction, Bureau of Plant Industry, United States Department of Agriculture, have been tested for their reaction to most of the important tomato diseases occurring in the North-Central region of the United States, and have been classified according to their resistance or susceptibility.

2. The introductions included 5 species of the genus Lycopersicon.
3. In some species high resistance was found to fusarium wilt, leaf mold, septoria and alternaria leaf blights, common tobacco mosaic, and bacterial spot. Resistance to ripe fruit rot caused by Colletotrichum was indicated. No marked resistance was found to bacterial canker and bacterial wilt.
4. Wide differences in the severity of cracking of red-fruited introductions were observed.
5. What appeared to be resistance to red spider was observed in one species.

LITERATURE CITED

1. Alexander, L. J. Leaf mold resistance in the tomato. Ohio Agr. Exp. Sta. Bul. 539. 1934.
2. _____. Survey of tomato varieties for resistance to septoria leaf spot. Ohio Agr. Exp. Sta. Ann. Rep., Bul. 548: 32-33. 1935.
3. _____. A new strain of the leaf mold fungus, Cladosporium fulvum. (Abst.) Phytopath. 30: 1. 1940.
4. Bohn, G. W., and C. W. Tucker. Studies on fusarium wilt of the tomato. I. Immunity in Lycopersicon pimpinellifolium Mill. and its inheritance in hybrids. Missouri Agr. Exp. Sta. Res. Bul. 311. 1940.
5. Holmes, F. O. The Chilean tomato, Lycopersicon chilense, as a possible source of disease resistance. Phytopath. 29: 215-216. 1939.
6. Locke, S. B. Resistance in South American Lycopersicon species to early blight and septoria blight. (Abst.) Phytopath. 32:12. 1942.
7. Muller, Cornelius H. A revision of the genus Lycopersicon. U. S. Dept. Agr. Misc. Pub. 382. 1940.
8. Porte, W. S., S. P. Doolittle, and F. L. Wellman. Hybridization of a mosaic-tolerant, wilt-resistant Lycopersicon hirsutum with Lycopersicon esculentum. Phytopath. 29: 757-759. 1939.
9. Price, W. C. Local lesions on bean leaves inoculated with tobacco mosaic virus. Amer. Journ. Bot. 17: 694-702. 1930.
10. Virgin, W. J. The Chilean tomato, Lycopersicon chilense, found resistant to curly top. Phytopath. 30: 280. 1940.
11. Wright, Vedder, and R. E. Lincoln. Resistance to defoliation diseases in tomato. Purdue University Agr. Exp. Sta. Ann. Rep. 53 (1940): 42-43. 1940.

Table 1. Disease resistance of introductions of the species Lycopersicon peruvianum

P.I. Number	FUSARIUM WILT						LEAF MOLD					
	Ohio			Indiana			Globe Strain			Globelle Strain		
	Healthy	Dis.	Dead	Tested	Healthy		Res.	Fleck	Susc.	Res.	Fleck	Susc.
	No.	No.	No.	No.	Pct.		No.	No.	No.	No.	No.	No.
126431*	1	0	8							10	0	0
126926*	1	0	13				25	0	0	34	0	0[b]
126928*	14	2	0							7	0	3
126929*	0	2	14	10	80					0	0	10
126930*	0	0	3	8	100					10	0	0
126944*	4	0	10				24	1	0	31	6	0[b]
126945*	1	0	15				20	5	0	26	11	0[b]
126946*	1	0	11	7	71		25	0	0	31	0	0[b]
128656*	40	1	1[b]							5	0	0
Variety dentatum												
126935*										4	1	0
127830*	0	2	1	8	50		14	0	0	21	0	0
127831*	2	0	1	12	0					2	7	9[b]
127832*	15	1	0							8	0	0
128645*	19	1	3[b]				25	0	0	33	0	0[b]
128646*	41	4	3[b]				24	0	0	35	0	0[b]
128647*	54	1	1[b]				23	0	1	29	0	6[b]
128648*	33	17	5[b]				24	0	0	23	0	0[b]
128652*	55	0	0[b]							0	0	10
128654	43	13	0[b]				25	0	0	34	0	0[b]
128655*	48	4	3[b]							9	1	0
128660*												
128661*												
128663*												
129021[a]												
Variety humifusum												
127829*	18	20	1[b]	17	88[b]		25	0	0	34	0	0[b]

* Introduction classified by Muller (7).

a/Listed by Muller as L. esculentum var. cerasiforme. Obviously seed has been mixed.

b/Indicates summation of more than one test.

Table 1. Disease resistance of introductions of the species Lycopersicon peruvianum (Cont.)

P.I. Number	SEPTORIA LEAF SPOT		ALTERNARIA LEAF SPOT		TOBACCO MOSAIC		BACTERIAL CANKER			BACTERIAL SPOT	BACTERIAL WILT
	Ohio	Ind.	Ohio	Ind.	Ohio	Ind.	Healthy	Dis.	Dead		Healthy
	Rank[c]	Rank[c]	Rank[c]	Rank[c]	Rank[d]	Rank[d]	No.	No.	No.	Rank[c]	Pct.
126431*		3		3		0	0	5	0	1	0
126926*	2	3	1	H	0	0	1	0	3	2	
126928*	H	2		2	S	S	0	4	1		0
126929*		2		H		0				1	
126930*	1	S		H	0	H	0	3	0	1	0
126944*	2	3		H	S	S	0	0	5	3	0
126945*	2	H		3	H	0	0	3	2	3	
126946*	1	H		H	0	0	0	5	0	3	
128656*	2		2		S		0	2	1		
Variety dentatum											
126935*	3				0		0	5	0		
127830*	0	3	1	2	0	0	0	4	2		
127831*	2	3	1	3	S	S	0	1	4		14
127832*	2	3	1	3	S	S	0	5	5[b]	3	
128645*	2		2		S		0	3	2		
128646*	2		1		S?		0	1	1		
128647*	1		1		S?						
128648*	1		1		S		0	4	1		
128652*	1		1		S?		0	1	2		
128654	0		1		H		0	1	4		
128655*	2				S		0	0	4		
128660*	2				S						
128661*	1		1		S						
128663*	2				S						
129021[a]	1		1		S						
Variety humifusum											
127829*	0	1	0	1	S	S	0	2	0	3	

c/ Ranked for resistance. 0 = healthy; 3 = susceptibility; H = heterogeneous.

d/ Ranked for resistance. 0 = healthy; S = susceptibility; H = heterogeneous.

Table 2. Disease resistance of introductions of the species Lycopersicon hirsutum

P.I. Number	FUSARIUM WILT						LEAF MOLD					
	Ohio			Indiana			Globe Strain			Globelle Strain		
	Healthy	Dis.	Dead	Tested	Healthy		Res.	Fleck	Susc.	Res.	Fleck	Susc.
	No.	No.	No.	No.	Pct.		No.	No.	No.	No.	No.	No.
126445*				20	100							
126446*				5	100							
126447*				2	100							
126449*												
126936*	2	4	10									
127826												
127827*												
Variety glabratum												
129157*												
134417	0	9	5				0	0	25	0	0	35[b/]
134418												

Table 3. Disease resistance of introductions of the species Lycopersicon glandulosum

P.I. Number	FUSARIUM WILT						LEAF MOLD					
	Ohio			Indiana			Globe Strain			Globelle Strain		
	Healthy	Dis.	Dead	Tested	Healthy		Res.	Fleck	Susc.	Res.	Fleck	Susc.
	No.	No.	No.	No.	Pct.		No.	No.	No.	No.	No.	No.
126434*												
126435*												
126438*												
126439*												
126440*												
126441*												
126443*												
126448*												
126450*												
126949*												

* Introductions classified by Muller (7).
a/Tested for presence of virus by local lesions method, Price (9).
b/Indicates summation of more than 1 test.

Table 2. Disease resistance of introductions of the species Lycopersicon hirsutum (Cont.)

P.I. Number	SEPTORIA LEAF SPOT Ohio Rank[c]	SEPTORIA LEAF SPOT Ind. Rank[c]	ALTERNARIA LEAF SPOT Ohio Rank[c]	ALTERNARIA LEAF SPOT Ind. Rank[c]	TOBACCO MOSAIC Ohio Rank[d]	TOBACCO MOSAIC Ind. Rank[d]	BACTERIAL CANKER Healthy No.	BACTERIAL CANKER Dis. No.	BACTERIAL CANKER Dead No.	BACTERIAL SPOT Rank[c]	BACTERIAL WILT Healthy Pct.
126445*	1	0		2	0	0[a/]					
126446*	1	1	1	2	0	0[a/]				1	
126447*	1	1	1	2	0	0					
126449*	1	1	1	2	0	0					
126936*	1	1	1	2	0	0					
127826	0		1		0						
127827*	0				0						
Variety glabratum											
129157*	1		0		S						
134417	1		0		S	S	0	0	4	2	
134418	1		0		S	S					

Table 3. Disease resistance of foreign introductions of the species Lycopersicon glandulosum (Cont.)

P.I. Number	SEPTORIA LEAF SPOT Ohio Rank[c]	SEPTORIA LEAF SPOT Ind. Rank[c]	ALTERNARIA LEAF SPOT Ohio Rank[c]	ALTERNARIA LEAF SPOT Ind. Rank[c]	TOBACCO MOSAIC Ohio Rank[d]	TOBACCO MOSAIC Ind. Rank[d]	BACTERIAL CANKER Healthy No.	BACTERIAL CANKER Dis. No.	BACTERIAL CANKER Dead No.	BACTERIAL SPOT Rank[c]	BACTERIAL WILT Healthy Pct.
126434*		2		2							
126435*		2		H							
126438*		3		3							
126439*		3		1							
126440*		2		3							
126441*		H		2							
126443*	1	2	1	H	S						
126448*	1	1	1	2	S						
126450*		3		H							
126949*		3		2		0				2	

c/ Ranked for resistance. 0 = healthy; 3 = susceptibility; H = heterogeneous.
d/ Ranked for resistance. 0 = healthy; S = susceptibility; H = heterogeneous.

Table 4. Disease resistance of introductions of the species Lycopersicon pimpinellifolium

P.I. Number	FUSARIUM WILT						LEAF MOLD					
	Ohio			Indiana			Globe Strain			Globelle Strain		
	Healthy	Dis.	Dead	Tested	Healthy		Res.	Fleck	Susc.	Res.	Fleck	Susc.
	No.	No.	No.	No.	Pct.		No.	No.	No.	No.	No.	No.
79532	25	15	0[b]	48	100[b]		25	0	0	32	3	0[b]
108245	0	0	13							0	0	10
112215	0	0	15				25	0	0	34	0	0[b]
118403	0	1	15							0	0	10
118409	0	0	15							0	0	9
118784	2	2	12									
126433*	0	0	14				23	1	0	0	19	6
126436*	2	5	9	3	33					5	5	0
126437*	0	1	13	8	50					0	0	10
126923*	25	21	9[b]	38	37[b]					2	4	4
126924*	0	1	13							0	0	10
126925*	1	3	12							7	0	3
126927*	0	1	14							0	9	0
126932*	2	5	5							0	1	5
126934*	6	0	10							5	0	2
126937*	14	7	9[b]							0	0	7
126938*	0	4	12				25	0	0	7	25	0[b]
126939*	5	6	5				25	0	0	24	2	8[b]
126941*	8	3	4							0	0	7
126947*	20	5	6[b]							0	9	0
126948*	13	12	2[b]							3	3	0
126949[a]	0	1	15							0	0	10
126951*	22	6	1[b]							0	5	5
126952*	20	5	6[b]							2	0	7
126953*	3	4	3							3	0	7
126954*	5	1	4							8	0	4
127805*	7	3	6	18	95[b]					1	0	9
127806*	40	0	0[b]	8	100					4	1	5
127807*	38	2	0[b]	8	100					1	0	9
127833*	0	1	1	49	95[b]					0	0	5
128194	0	3	10							0	0	10
129105	0	0	10									
129108	0	4	10									
129143	0	0	15							0	2	8
133542	2	0	10							0	0	10

* Introductions identified by Muller (7).
a/Identified by Muller as L. glandulosum. Obviously a mixture.
b/Summation of more than 1 test.

Table 4. Disease resistance of introductions of the species Lycopersicon pimpinellifolium (Cont.)

P.I. Number	SEPTORIA LEAF SPOT		ALTERNARIA LEAF SPOT		TOBACCO MOSAIC		BACTERIAL CANKER			BACTERIAL SPOT	BACTERIAL WILT
	Ohio	Ind.	Ohio	Ind.	Ohio	Ind.	Healthy	Dis.	Dead		
	Rank[c]	Rank[c]	Rank[c]	Rank[c]	Rank[d]	Rank[d]	No.	No.	No.	Rank[c]	Healthy Pct.
79532		3		3		S	2	2	0	2	
108245							2	3	0		
112215							1	4	0		
118403							0	3	2		
118409							0	5	0		
118784											
126433*		2		2		S	2	2	0	3	
126436*		3		3		S	0	4	0	3	
126437*		3		3		S	0	4	1	3	
126923*		2		3		S	2	2	0	1	
126924*		2		3		S	1	4	0	2	
126925*		2		3		S	3	2	0		0
126927*		3		3		S	1	3	0	3	
126932*		3				S	0	3	2	2	0
126934*		3		3		S	1	2	2	2	0
126937*		3		3		S	0	3	2	3	0
126938*		3		3		S	0	3	1	1	20
126939*		3		3		S	0	5	0	1	
126941*		3		3		S	0	5	0	3	0
126947*		2		3		S	2	3	0	3	0
126948*		2		3		S	0	5	0	1	0
126949							3	1	1		
126951*		3		3		S	0	4	0	2	0
126952*		3		3		S	0	3	2	1	14
126953*		3		3		S	0	5	0	3	0
126954*		3		3		S	0	4	0	3	14
127805*	1	2		3	S	S	0	0	3		14
127806*	1	2		3	S	S	1	4	0		0.
127807*	1	2		3	S	S	1	3	1	2	0
127833*	2	3		3	S	S	1	3	1	3	0
128194	2				S						
129105	2				S						
129108	2				S						
129143	2				0		1	3	0		
133542	2	2			S	S	0	4	1	3	

c/ Ranked for resistance. 0 = healthy; 3 = susceptibility; H = heterogeneous.
d/ Ranked for resistance. 0 = healthy; S = susceptibility; H = heterogeneous.

Table 5. Disease resistance of introductions of the species Lycopersicon esculentum grouped according to horticultural types

P.I. Number	FUSARIUM WILT: Ohio: Healthy	Ohio: Dis.	Ohio: Dead	Indiana: Tested	Indiana: Healthy	LEAF MOLD: Globe Strain: Res.	Globe Strain: Fleck	Globe Strain: Susc.	Globelle Strain: Res.	Globelle Strain: Fleck	Globelle Strain: Susc.
	No.	No.	No.	No.	Pct.	No.	No.	No.	No.	No.	No.
Cerasiforme type											
91458											
92855				125	42[b]						
95588											
126417*	1	2	11	16	24[b]						
126418*	0	4	9								
126419*	0	6	10	14	38[b]						
126425*	1	4	9						0	0	10
126426*	0	0	15								
126427*	0	0	14	8	0						
126428*	0	1	9	8	0						
126429*	0	0	5	8	0						
126942*	1	6	7						0	0	5
126950*	34	4	1[b]						1	0	9
127814*	0	4	10								
128596*	1	8	4								
129027*	13	1	0						0	9	0
129111	0	1	16								
129112*	1	4	7								
129146[a]	11	9	5[b]								
129156*	12	3	0						7	0	0
Pyriforme type											
92861				6	83						
92864				21	0						
92865											
92866				5	40						
93302				21	24						
95558											
108246	0	3	13								
126420*	0	4	10	12	17[b]						
126452*	0	0	14								

* Introductions identified by Muller (7).
a/Identified by Muller as L. peruvianum. Obviously a mixture.
b/Indicates summation of more than one test.

Table 5. Disease resistance of foreign introductions of the species Lycopersicon esculentum grouped according to horticultural types (Cont.)

P.I. Number	SEPTORIA LEAF SPOT		ALTERNARIA LEAF SPOT		TOBACCO MOSAIC		BACTERIAL CANKER			BACTERIAL SPOT	BACTERIAL WILT
	Ohio	Ind.	Ohio	Ind.	Ohio	Ind.	Healthy	Dis.	Dead		Healthy
	Rank[c]	Rank[c]	Rank[c]	Rank[c]	Rank[d]	Rank[d]	No.	No.	No.	Rank[c]	Pct.
Cerasiforme type											
91458		3		3		S				3	0
92855		3		3		S				3	0
95588		3		3		S				3	14
126417*		3		3		S					0
126418*											
126419*		3		3		S	1	4	0	2	
126425*											
126426*											
126427*		3		3		S				2	
126428*		3		3		S				2	
126429*		3		3						2	
126942*		3		3		S	0	5	0	3	0
126950*		3		3		S	0	4	1	1	14
127814*	2				S						
128596*	3				S						
129027*	3				S		0	2	3		
129111	3				S						
129112*	3				S						
129146[a/]	3				S						
129156*	2				S						
Pyriforme type											
92861		3		3		S				3	
92864		3		3		S				3	
92865		3		3		S				3	
92866		3		3		S				3	0
93302		3		3		S				3	
95558		3		3		S				3	0
108246											
126420*		3		3		S				3	0
126452*		3		3		S					0

c/ Ranked for resistance. 0 = healthy; 3 = susceptibility; H = heterogeneous.
d/ Ranked for resistance. 0 = healthy; S = susceptibility; H = heterogeneous.

Table 5 (Cont.)

P.I. Number	FUSARIUM WILT: Ohio: Healthy	Ohio: Dis.	Ohio: Dead	Indiana: Tested	Indiana: Healthy	LEAF MOLD: Globe Strain: Res.	Globe Strain: Fleck	Globe Strain: Susc.	Globelle Strain: Res.	Globelle Strain: Fleck	Globelle Strain: Susc.
	No.	No.	No.	No.	Pct.	No.	No.	No.	No.	No.	No.
San Marzano type											
117564	0	1	14								
118324	0	0	15								
124581	0	2	12								
127810	0	2	14								
128635	0	1	15								
128636	0	4	12								
128637	0	2	14						0	0	10
129044	0	0	14								
129051	0	1	14								
131880	0	0	16								
131881	0	1	31 b/	5	20				0	0	10
Small-sized smooth red type											
92356											
100697											
102707											
102719				19	16						
106997	0	0	16								
116047	0	0	13								
117566	0	3	12								
117567	1	1	13								
117897	3	3	8								
117898	3	1	11								
117899	0	2	13								
118407	0	0	15								
118611	0	1	14								
118778	1	2	12								
118782	0	0	15								
118785	0	2	13								
118790	0	0	15								
120275	0	4	26								
121438	0	3	12								
123436	0	1	13								
123538	1	2	11								
124133	1	1	12								
125830	0	4	10	28	7 b/						
126409*	1	3	10	32	22 b/						
126410*	0	2	12	25	8 b/						
126411*	0	2	12	9	22						
126423*	0	2	12	8	12						

* Introductions identified by Muller (7).

b/ Summation of more than one test.

Table 5. (Cont.)

P.I. Number	SEPTORIA LEAF SPOT Ohio Rank[c]	SEPTORIA LEAF SPOT Ind. Rank[c]	ALTERNARIA LEAF SPOT Ohio Rank[c]	ALTERNARIA LEAF SPOT Ind. Rank[c]	TOBACCO MOSAIC Ohio Rank[d]	TOBACCO MOSAIC Ind. Rank[d]	BACTERIAL CANKER Healthy No.	BACTERIAL CANKER Dis. No.	BACTERIAL CANKER Dead No.	BACTERIAL SPOT Rank[c]	BACTERIAL WILT Healthy Pct.
San Marzano type											
117564											
118324											
124581											
127810	3				S						
128635	3				S						
128636	3				S						
128637	3				S		0	5	0		
129044	3				S						
129051	3				S						
131880	3				S	S				3	
131881	3				S	S	0	4	0	3	
Small-sized smooth red type											
92356		3		3		S				3	0
100697		3		3		S				3	
102707		3		3		S				3	
102719		3		3		S					0
106997											
116047											
117566											
117567											
117897											
117898											
117899											
118407											
118611											
118778											
118782											
118785											
118790											
120275											
121438											
123436											
123538											
124133											
125830		3		3		S				3	28
126409*	3	3	3	3	S	S				3	
126410*	3	3	3	3	S	S				3	0
126411*	3	3	3	3	S	S				3	0
126423*		3		3		S				3	0

c/ Ranked for resistance. 0 = healthy; 3 = susceptibility; H = heterogeneous.
d/ Ranked for resistance. 0 = healthy; S = susceptibility; H = heterogeneous.

Table 5 (Cont.)

P.I. Number	FUSARIUM WILT: Ohio: Healthy	Ohio: Dis.	Ohio: Dead	Indiana: Tested	Indiana: Healthy	LEAF MOLD: Globe Strain: Res.	Globe Strain: Fleck	Globe Strain: Susc.	Globelle Strain: Res.	Globelle Strain: Fleck	Globelle Strain: Susc.
	No.	No.	No.	No.	Pct.	No.	No.	No.	No.	No.	No.
Small-sized smooth red type (Cont.)											
126424*	0	4	12	7	14				0	0	9
126451*	1	1	6	8	0						
126905*	0	0	14								
126912*	1	3	12	15	60b/						
126915*	25	9	4b/	14	38b/						
126921*	0	3	11	15	7b/						
126922*	0	2	12								
127467*	0	0	14	13	0b/						
127468*	0	0	14	8	0						
127469*	0	0	14								
127795*	0	2	14	8	0						
127811*	1	0	14	9	28						
127812*	0	6	10								
127813*	4	4	7	8	12						
127816	0	0	16	6	17						
127818*	0	1	15								
127821	1	1	12								
128275	0	2	14								
128626	0	8	7								
128633	0	1	15								
129038	0	0	16								
129039	0	0	16								
129053	0	3	12								
129054	0	2	13								
129057	1	6	6								
129065	1	1	13								
129080	0	0	16								
129093	0	0	16								
129095	0	0	16								
129099	1	0	9								
129118	0	0	16								
129119	0	0	15								
129121	11	13	16								
129131	0	3	12								
134208	1	3	12						0	0	10
138630											
Small-sized smooth pink-fruited type											
126412*	1	3	10	18	63b/						
126414*	0	4	10	16	13b/						
126820	0	0	14	7	14						

* Introductions identified by Muller (7).
b/ Summation of more than one test.

Table 5 (Cont.)

P.I. Number	SEPTORIA LEAF SPOT Ohio Rank[c]	SEPTORIA LEAF SPOT Ind. Rank[c]	ALTERNARIA LEAF SPOT Ohio Rank[c]	ALTERNARIA LEAF SPOT Ind. Rank[c]	TOBACCO MOSAIC Ohio Rank[d]	TOBACCO MOSAIC Ind. Rank[d]	BACTERIAL CANKER Healthy No.	BACTERIAL CANKER Dis. No.	BACTERIAL CANKER Dead No.	BACTERIAL SPOT Rank[c]	BACTERIAL WILT Healthy Pct.
Small-sized smooth red type (Cont.)											
126424*	3	3		3	S	S	1	3	1	3	
126451*		3		3		S				3	
126905*											
126912*		3		3		S				3	
126915*		3		3		S				3	
126921*		3		3		S				3	
126922*											
127467*		3		3		S				3	
127468*											
127469*		3		3		S				2	
127795*		3		3		S	0	3	1	2	
127811*	3	3		3	S	S				3	0
127812*	3				S						
127813*	3	3		3	S	S				2	
127816	3	3		3	S	S				2	
127818*	3				S						
127821	3				S						
128275	3				S						
128626	3				S						
128633	3				S						
129038	3				S						
129039	3				S						
129053	3				S						
129054	3				S						
129057	3				S						
129065	3				S						
129080	3				S						
129093	3				S						
129095	3				S						
129099	3				S						
129118	3				S						
129119	3				S						
129121	3				S						
129131	3				S						
134208	3				S		0	5	0		
138630	3				S						
Small-sized smooth pink-fruited type											
126412*		3		3		S				3	
126414*		3		3		S				3	
126820						S					

c/ Ranked for resistance. 0 = healthy; 3 = susceptibility; H = heterogeneous.
d/ Ranked for resistance. 0 = healthy; S = susceptibility; H = heterogeneous.

Table 5 (Cont.)

P.I. Number	FUSARIUM WILT: Ohio: Healthy	Ohio: Dis.	Ohio: Dead	Indiana: Tested	Indiana: Healthy	LEAF MOLD: Globe Strain: Res.	Globe Strain: Fleck	Globe Strain: Susc.	Globelle Strain: Res.	Globelle Strain: Fleck	Globelle Strain: Susc.
	No.	No.	No.	No.	Pct.	No.	No.	No.	No.	No.	No.
Small-sized smooth yellow-fruited type											
108244	0	6	26[b]								
Small-sized smooth red-fruited type, apparently L. esculentum X L. pimpinellifolium crosses											
109315	0	0	16	20	5						
109316	0	2	14								
114038	0	0	16								
114967	0	0	16								
114968	0	2	14								
114969	0	2	13								
129022	7	0	9						5	4	0
129029	7	3	4						0	0	9
129060	0	0	12								
129064	0	5	9								
129082	0	1	15								
129084	0	1	15								
129090	0	1	15						0	0	5
129091	0	0	3						0	0	10
129096	0	0	16								
129097	0	0	14								
129098	1	1	12								
129110	0	0	10								
129123	0	1	14								
129155	12	4	0						9	1	0
129686	0	1	15						4	0	4
135022	0	2	14						0	0	10
Small-sized rough red-fruited type											
114965	0	3	13								
126408	0	0	15	20	35[b]						
126415*	0	0	14	9	55						
126421*	0	8	8	16	54[b]				0	0	9
126422*	0	4	10								
126907*	0	3	11	8	24						
126908*	0	3	10	8	0						
126909*	0	2	12	9	22						
126910*	2	5	6	8	37						
126911*	1	2	11	20	50[b]						
126914*	10	3	1	21	43[b]						

* Introductions identified by Muller (7).

b/ Summation of more than one test.

Table 5 (Cont.)

P.I. Number	SEPTORIA LEAF SPOT Ohio Rank[c]	SEPTORIA LEAF SPOT Ind. Rank[c]	ALTERNARIA LEAF SPOT Ohio Rank[c]	ALTERNARIA LEAF SPOT Ind. Rank[c]	TOBACCO MOSAIC Ohio Rank[d]	TOBACCO MOSAIC Ind. Rank[d]	BACTERIAL CANKER Healthy No.	BACTERIAL CANKER Dis. No.	BACTERIAL CANKER Dead No.	BACTERIAL SPOT Rank[c]	BACTERIAL WILT Healthy Pct.
Small-sized smooth yellow-fruited type											
108244											
Small-sized smooth red-fruited type, apparently L. esculentum X L. pimpinellifolium crosses											
109315		3		3		S					0
109316											
114038											
114967											
114968											
114969											
129022	3				S		0	2	1		
129029	3				S		0	5	0		
129060	3				S						
129064	3				S						
129082	2				S						
129084	2				S						
129090	2				S						
129091	2				S		0	0	5		
129096	3				S		0	1	4		
129097	3				S						
129098	3				S						
129110	3				S						
129123	3				S						
129155	2				S		0	3	1		
129686	2				S		0	4	1		
135022	3				S		0	3	2		
Small-sized rough red-fruited type											
114965											
126408		3		3		S				3	
126415*	3	3		3	S	S				3	
126421*	3	3		3	S	S	0	5	0	3	0
126422*	3	3		3	S	S				3	
126907*		3		3		S				3	
126908*		3		3		S				3	
126909*		3		3		S				2	
126910*		3		3		S					
126911*		3		3		S				2	
126914*		3		3		S				3	

c/ Ranked for resistance. 0 = healthy; 3 = susceptibility; H = heterogeneous.
d/ Ranked for resistance. 0 = healthy; S = susceptibility; H = heterogeneous.

Table 5 (Cont.)

P.I. Number	FUSARIUM WILT: Ohio: Healthy No.	Ohio: Dis. No.	Ohio: Dead No.	Indiana: Tested No.	Indiana: Healthy Pct.	LEAF MOLD: Globe Strain: Res. No.	Globe Strain: Fleck No.	Globe Strain: Susc. No.	Globelle Strain: Res. No.	Globelle Strain: Fleck No.	Globelle Strain: Susc. No.
Small-sized rough red-fruited type (Cont.)											
126916*	1	2	11								
127803*	1	3	11	7	29						
127819*	0	0	16	8	0						
128222	0	4	12								
128628	0	6	9								
129026	0	9	7						0	0	9
129055	0	3	10								
129106	0	0	8								
129115	0	0	16								
Small-sized rough yellow-fruited type											
126413*	0	4	10								
Medium-sized smooth red-fruited type											
92853				21	35b/						
92854				33	16b/						
92856				6	17						
92857											
92858				4	0						
92859				25	4b/						
92860				14	0b/						
92862				13	28						
95583											
95586				10	0						
98097											
102716											
102885											
102886											
105342				12	8b/						
109314	0	0	16								
109512	0	1	14								
109513											
109833	0	0	14	15	26						
109834	0	4	10								
109835	1	1	14								
109838	1	0	12								
115601	0	1	14								
115872	0	0	15								
117563	1	0	15								

* Introductions identified by Muller (7).

b/ Summation of more than one test.

Table 5 (Cont.)

P.I. Number	SEPTORIA LEAF SPOT Ohio Rank[c]	SEPTORIA LEAF SPOT Ind. Rank[c]	ALTERNARIA LEAF SPOT Ohio Rank[c]	ALTERNARIA LEAF SPOT Ind. Rank[c]	TOBACCO MOSAIC Ohio Rank[d]	TOBACCO MOSAIC Ind. Rank[d]	BACTERIAL CANKER Healthy No.	BACTERIAL CANKER Dis. No.	BACTERIAL CANKER Dead No.	BACTERIAL SPOT Rank[c]	BACTERIAL WILT Healthy Pct.
Small-sized rough red-fruited type (Cont.)											
126916*		3		3		S					
127803*	3	3		3	S	S				2	
127819*	3	3		3	S	S				3	0
128222	3				S						
128628	3				S						
129026	3				S		0	3	1		
129055	2				S						
129106	3				S						
129115	3				S						
Small-sized rough yellow-fruited type											
126413*											
Medium-sized smooth red-fruited type											
92853		3		3		S				3	0
92854		3		3		S				3	0
92856		3		3		S				3	0
92857		3		3		S				3	
92858		3		3		S				3	0
92859		3		3		S				3	0
92860		3		3		S				3	14
92862		3		3		S				3	14
95583		3		3		S				3	0
95586		3		3		S				3	0
98097		3		3		S				3	0
102716		3		3		S				3	0
102885		3		3		S				3	14
102886		3		3		S					
105342		3		3		S				3	0
109314											
109512		3		3		S				3	0
109513		3		3		S				3	0
109833		3		3		S				3	0
109834		3		3		S				3	28
109835		3		3		S				3	0
109838		3		3		S				3	0
115601											
115872											
117563											

c/ Ranked for resistance. 0 = healthy; 3 = susceptibility; H = heterogeneous.
d/ Ranked for resistance. 0 = healthy; S = susceptibility; H = heterogeneous.

Table 5 (Cont.)

P.I. Number	FUSARIUM WILT: Ohio: Healthy	Ohio: Dis.	Ohio: Dead	Indiana: Tested	Indiana: Healthy	LEAF MOLD: Globe Strain: Res.	Globe Strain: Fleck	Globe Strain: Susc.	Globelle Strain: Res.	Globelle Strain: Fleck	Globelle Strain: Susc.
	No.	No.	No.	No.	Pct.	No.	No.	No.	No.	No.	No.
					Medium-sized smooth red-fruited type (Cont.)						
117565	0	1	15								
117900	0	3	12								
118326	0	2	14								
118327	4	2	8								
118328	0	3	12								
118685	0	7	9			0	0	25	0	10	25[b]
118686	1	2	11								
119104	1	4	11								
119778	0	1	14								
123433	0	3	11								
123434	0	2	12								
123435	0	1	13								
123437	0	2	12								
123438	0	0	14								
126906	0	3	11								
127799	1	4	9	8	12						
127808	0	3	13								
128224	0	1	15								
128270	0	0	16								
128274	0	1	12								
128288	0	1	15								
128294	0	2	14								
128591	0	1	15								
128595	0	4	12								
128630	0	1	15								
128641	0	2	14								
128642	0	0	16								
129018	0	3	13								
129069	0	1	14								
129070	0	0	16								
129073	0	0	16								
129077	0	0	16								
129100	0	0	9								
129109	0	2	11								
129114	0	1	15								
129126	0	0	16								
129129	0	3	12								
129140	0	1	15								
131878	0	3	13	16	74[b]						
131879	0	0	14								
134207	1	2	13						0	0	9
138618											
138622											
138625											

[b] Summation of more than one test.

Table 5 (Cont.)

P.I. Number	SEPTORIA LEAF SPOT Ohio Rank[c]	SEPTORIA LEAF SPOT Ind. Rank[c]	ALTERNARIA LEAF SPOT Ohio Rank[c]	ALTERNARIA LEAF SPOT Ind. Rank[c]	TOBACCO MOSAIC Ohio Rank[d]	TOBACCO MOSAIC Ind. Rank[d]	BACTERIAL CANKER Healthy No.	BACTERIAL CANKER Dis. No.	BACTERIAL CANKER Dead No.	BACTERIAL SPOT Rank[c]	BACTERIAL WILT Healthy Pct.
Medium-sized smooth red-fruited type (Cont.)											
117565											
117900											
118326											
118327											
118328											
118685	3				S		1	3	0		
118686											
119104											
119778											
123433											
123434											
123435											
123437											
123438											
126906											
127799		3		3		S				2	
127808											
128224	3				S						
128270	3				S						
128274	3				S						
128288	3				S						
128294	3				S						
128591	3				S						
128595	3				S						
128630	2				S						
128641	3				S						
128642	3				S						
129018	3				S						
129069	1				S						
129070	2				S						
129073	3				S						
129077	3				S						
129100	3				S						
129109	3				S						
129114	3				S						
129126	3				S						
129129	3				S						
129140	3				S						
131878	3				S						
131879	3				S						
134207	3				S	S	0	3	0	3	
138618	3				S	S				3	0
138622	3				S						
138625	3				S						

c/ Ranked for resistance. 0 = healthy; 3 = susceptibility; H = heterogeneous.
d/ Ranked for resistance. 0 = healthy; S = susceptibility; H = heterogeneous.

Table 5 (Cont.)

P.I. Number	FUSARIUM WILT: Ohio: Healthy No.	Ohio: Dis. No.	Ohio: Dead No.	Indiana: Tested No.	Indiana: Healthy Pct.	LEAF MOLD: Globe Strain: Res. No.	Globe Strain: Fleck No.	Globe Strain: Susc. No.	Globelle Strain: Res. No.	Globelle Strain: Fleck No.	Globelle Strain: Susc. No.
Medium-sized smooth yellow-fruited type											
128248	0	1	15								
Medium-sized rough red-fruited type											
95592											
102714				10	30						
105267				14	28						
109112	0	4	12	14	87[b/]						
109832	0	4	12								
109836	0	0	16								
114966	0	1	15								
118783	0	0	14								
118787	0	0	15								
118789	0	2	13								
125831	3	3	8	12	83[b/]						
126407	2	3	10	24	9[b/]						
126919*	0	2	12	12	25[b/]						
126920*	0	2	12	8	0						
127582	0	1	14								
127794*	0	3	11	8	0						
127796*	1	3	10	8	0						
127797*	0	3	11	18	9[b/]						
127798*	1	0	13	7	29						
127800*	0	3	13	8	0						
127801*	0	0	16	8	25						
127804	1	0	15								
127824	0	1	15	10	0						
128225	0	1	15								
128229	0	1	15								
128237	0	0	16								
128239	1	4	11								
128241	0	3	13								
128242	0	3	13								
128243	0	1	15								
128254	0	5	11								
128599	0	0	15								
128603	0	1	15								
128604	0	0	16								
128605	0	2	13								
128625	0	1	15								
128634	1	3	12						0	0	10

* Introductions identified by Muller (7).

b/ Summation of more than one test.

Table 5. (Cont.)

P.I. Number	SEPTORIA LEAF SPOT Ohio Rank[c]	SEPTORIA LEAF SPOT Ind. Rank[c]	ALTERNARIA LEAF SPOT Ohio Rank[c]	ALTERNARIA LEAF SPOT Ind. Rank[c]	TOBACCO MOSAIC Ohio Rank[d]	TOBACCO MOSAIC Ind. Rank[d]	BACTERIAL CANKER Healthy No.	BACTERIAL CANKER Dis. No.	BACTERIAL CANKER Dead No.	BAC-TERIAL SPOT Rank[c]	BACTERIAL WILT Healthy Pct.
				Medium-sized smooth yellow-fruited type							
128248	3				S						
				Medium-sized rough red-fruited type							
95592		3		3		S				3	14
102714		3		3		S				2	14
105267		3		3		S				3	0
109112		3		3		S				3	0
109832											
109836											
114966											
118783											
118787											
118789											
125831		3		3		S				3	
126407		3		3		S				3	0
126919*		3		3		S				3	
126920*		3		3		S				2	
127582											
127794*		3		3		S				2	
127796*		3		3		S				3	
127797*		3		3		S				3	
127798*		3		3		S				3	
127800*		3		3		S				3	
127801*		3		3		S				1	
127804*											
127824	3	3		3	S	S				1	
128225	3	3		3	S	S					
128229	3				S						
128237	3				S						
128239	3				S						
128241	3				S						
128242	3				S						
128243	3				S						
128254	3				S						
128599	3				S						
128603	3				S						
128604	3				S						
128605	3				S						
128625	3				S						
128634	3				S		0	5	0		

c/ Ranked for resistance. 0= healthy; 3 = susceptibility; H = heterogeneous.
d/ Ranked for resistance. 0= healthy; S = susceptibility; H = heterogeneous.

Table 5 (Cont.)

P.I. Number	FUSARIUM WILT: Ohio: Healthy	Ohio: Dis.	Ohio: Dead	Indiana: Tested	Indiana: Healthy	LEAF MOLD: Globe Strain: Res.	Globe Strain: Fleck	Globe Strain: Susc.	Globelle Strain: Res.	Globelle Strain: Fleck	Globelle Strain: Susc.
	No.	No.	No.	No.	Pct.	No.	No.	No.	No.	No.	No.
Medium-sized rough red-fruited type (Cont.)											
129024											
129025	0	4	12								
129032	1	7	8						0	0	6
129033	0	1	15						0	2	3
129058	0	1	5						0	2	7
129067	0	7	9								
129086	0	0	16								
129117	0	0	16								
129125	0	1	15								
129137	0	1	15								
129692	0	0	16								
129693	0	1	15								
131882	0	1	15	16	0[b]						
138627											
Medium-sized rough pink-fruited type											
118404	0	2	14								
119788	0	0	14								
Medium-sized rough yellow-fruited type											
127823*	0	5	11								
Large-sized smooth red-fruited type											
16160				27	3[b]						
92863				5	20						
95584											
95585				5	0						
95587											
95589				8	12						
95590				17	18						
102715											
102717											
102722				6	50						
102723											
102724				3	0						
102725				11	27						
109113	0	0	16								
109831	0	1	15	12	83[b]						

* Introductions identified by Muller (7).
b/ Summation of more than one test.

Table 5 (Cont.)

P.I. Number	SEPTORIA LEAF SPOT Ohio Rank[c]	SEPTORIA LEAF SPOT Ind. Rank[c]	ALTERNARIA LEAF SPOT Ohio Rank[c]	ALTERNARIA LEAF SPOT Ind. Rank[c]	TOBACCO MOSAIC Ohio Rank[d]	TOBACCO MOSAIC Ind. Rank[d]	BACTERIAL CANKER Healthy No.	BACTERIAL CANKER Dis. No.	BACTERIAL CANKER Dead No.	BACTERIAL SPOT Rank[c]	BACTERIAL WILT Healthy Pct.
Medium-sized rough red-fruited type (Cont.)											
129024	3				S		0	3	0		
129025	3				S		0	1	4		
129032	3				S		0	4	0		
129033	3				S		0	5	0		
129058	2				S						
129067	3				S						
129086	3				S						
129117	3				S						
129125	3				S						
129137	3				S						
129692	3				S						
129693	3				S						
131882	3				S	S				3	0
138627	3				S						
Medium-sized rough pink-fruited type											
118404											
118788											
Medium-sized rough yellow-fruited type											
127823*											
Large-sized smooth red-fruited type											
16160		3		3		S				3	0
92863		3		3		S				3	0
95584		3		3		S				3	0
95585		3		3		S				3	0
95587		3		3		S				2	
95589		3		3		S				3	14
95590		3		3		S					
102715						S				3	
102717		3		3		S				3	
102722		3		3		S				3	0
102723		3		3		S				3	0
102724		3		3		S				3	0
102725		3		3		S				3	0
109113		3		3		S					0
109831		3		3		S				3	0

c/ Ranked for resistance. 0 = healthy; 3 = susceptibility; H = heterogeneous.
d/ Ranked for resistance. 0 = healthy; S = susceptibility; H = heterogeneous.

Table 5 (Cont.)

P.I. Number	FUSARIUM WILT: Ohio: Healthy	Ohio: Dis.	Ohio: Dead	Indiana: Tested	Indiana: Healthy	LEAF MOLD: Globe Strain: Res.	Globe Strain: Fleck	Globe Strain: Susc.	Globelle Strain: Res.	Globelle Strain: Fleck	Globelle Strain: Susc.
	No.	No.	No.	No.	Pct.	No.	No.	No.	No.	No.	No.
Large-sized smooth red-fruited type (Cont.)											
109837	0	1	13								
116219	0	0	16								
119776	0	3	12								
120261	0	1	13								
120274	3	2	10								
128218	1	2	13						0	0	10
128285	0	6	10								
128287	0	3	13								
128289	0	7	9								
128290	0	1	15								
128292	0	2	14								
128293	0	7	9						0	0	10
128598	0	0	15								
128602	0	0	10								
128610	0	2	14								
128613	0	0	16								
128615	0	2	14								
129068	1	7	7								
129113	0	0	10								
129132	0	0	16								
129133	0	0	16								
129134	0	0	15								
129138	0	0	16								
129139	0	0	16								
131877	0	1	15	6	33						
Large-sized smooth pink-fruited type											
109514	0	0	16						0	0	10
127802	0	3	13						0	0	10
Large-sized rough red-fruited type											
95591				28	5b/						
102713				4	0						
105266											
120258	0	1	14								
120276	0	2	13								
124582											
128217	0	0	16								
128221	0	0	16								

b/ Summation of more than one test.

Table 5 (Cont.)

P.I. Number	SEPTORIA LEAF SPOT Ohio Rank[c]	SEPTORIA LEAF SPOT Ind. Rank[c]	ALTERNARIA LEAF SPOT Ohio Rank[c]	ALTERNARIA LEAF SPOT Ind. Rank[c]	TOBACCO MOSAIC Ohio Rank[d]	TOBACCO MOSAIC Ind. Rank[d]	BACTERIAL CANKER Healthy No.	BACTERIAL CANKER Dis. No.	BACTERIAL CANKER Dead No.	BACTERIAL SPOT Rank[c]	BACTERIAL WILT Healthy Pct.
Large-sized smooth red-fruited type (Cont.)											
109837											
116219											
119776											
120261											
120274											
128218	3				S		0	4	0		
128285	3				S						
128287	3				S						
128289	3				S						
128290	3				S						
128292	3				S						
128293	3				S		0	4	1		
128598	3				S						
128602	3				S						
128610	3				S						
128613	3				S						
128615	3				S						
129068	3				S						
129113	3				S						
129132	3				S						
129133	3				S						
129134	3				S						
129138	3				S						
129139	3				S						
131877	3	3		3	S	S				3	
Large-sized smooth pink-fruited type											
109514	3	3		3	S	S	0	4	0	3	0
127802	3				S		2	3	1		
Large-sized rough red-fruited type											
95591		3		3	S	S				3	14
102713		3		3		S					0
105266											
120258	3				S						
120276	3				S						
124582											
128217	3				S						
128221	3				S						

c/ Ranked for resistance. 0 = healthy; 3 = susceptibility; H = heterogeneous.
d/ Ranked for resistance. 0 = healthy; S = susceptibility; H = heterogeneous.

Table 5 (Cont.)

P.I. Number	FUSARIUM WILT: Ohio: Healthy	Ohio: Dis.	Ohio: Dead	Indiana: Tested	Indiana: Healthy	LEAF MOLD: Globe Strain: Res.	Globe Strain: Fleck	Globe Strain: Susc.	Globelle Strain: Res.	Globelle Strain: Fleck	Globelle Strain: Susc.
	No.	No.	No.	No.	Pct.	No.	No.	No.	No.	No.	No.
Large-sized rough red-fruited type (Cont.)											
128223	0	1	15								
128255*	0	1	15								
128256	0	3	13								
128257	0	2	13								
128286	0	2	14								
128291	0	3	13								
128594	0	0	16								
128600	1	1	12								
128601	0	2	12								
128606	0	0	16								
128607	0	0	6								
128608	0	0	16								
128614	0	2	14								
128616	0	3	13								
128617	1	1	11								
128618	1	6	9								
128621	4	10	2								
128623	0	0	16								
128640	0	0	16								
129034	0	6	10						0	3	4
129043	0	0	16								
129056	0	5	8								
129061	0	0	16						0	0	16
129072	0	0	16								
129075	0	0	16								
129076	0	0	15								
129130	0	4	11								
129688	0	4	12						0	0	9
Large-sized rough yellow-fruited type											
128234	0	6	10								
128250	0	3	13								
Unclassified											
93046				7	14						
102884				24	9						
103055				6	33						
105225				14	0						
105266				14	0						

* Introductions identified by Muller (7).

b/ Summation of more than one test.

Table 5. (Cont.)

P.I. Number	SEPTORIA LEAF SPOT Ohio Rank[c]	SEPTORIA LEAF SPOT Ind. Rank[c]	ALTERNARIA LEAF SPOT Ohio Rank[c]	ALTERNARIA LEAF SPOT Ind. Rank[c]	TOBACCO MOSAIC Ohio Rank[d]	TOBACCO MOSAIC Ind. Rank[d]	BACTERIAL CANKER Healthy No.	BACTERIAL CANKER Dis. No.	BACTERIAL CANKER Dead No.	BACTERIAL SPOT Rank[c]	BACTERIAL WILT Healthy Pct.
Large-sized rough red-fruited type (Cont.)											
128223	3				S						
128255*	3				S						
128256	3				S						
128257	3				S						
128286	3				S						
128291	3				S						
128594	3				S						
128600	3				S						
128601	3				S						
128606	3				S						
128607	3				S						
128608	3				S						
128614	3				S						
128616	3				S						
128617	3				S						
128618	3				S						
128621	3				S						
128623	3				S						
128640	3				S						
129034	3				S		1	4	0		
129043	3				S						
129056	3				S						
129061	3				S		0	2	1		
129072	3				S						
129075	3				S						
129076	3				S						
129130	3				S						
129688	3				S		0	5	0		
Large-sized rough yellow-fruited type											
128234	3				S						
128250	3				S						
Unclassified											
93046		3		3		S					
102884		3		3		S				3	0
103055		3		3		S				3	0
105225		3		3		S				3	0
105266		3		3		S				3	0

c/ Ranked for resistance. 0 = healthy; 3 = susceptibility; H = heterogeneous.
d/ Ranked for resistance. 0 = healthy; S = susceptibility; H = heterogeneous.

Table 5 (Cont.)

P.I. Number	FUSARIUM WILT: Ohio: Healthy	Ohio: Dis.	Ohio: Dead	Indiana: Tested	Indiana: Healthy	LEAF MOLD: Globe Strain: Res.	Globe Strain: Fleck	Globe Strain: Susc.	Globelle Strain: Res.	Globelle Strain: Fleck	Globelle Strain: Susc.
	No.	No.	No.	No.	Pct.	No.	No.	No.	No.	No.	No.
Unclassified (Cont.)											
124582				33	13 b/						
126815				8	0						
127798				7	28						
129081	0	0	16								
129148	0	5	11						8	2	0
129691	0	0	16						0	0	10

b/ Summation of more than one test.

Table 5. (Cont.)

P.I. Number	SEPTORIA LEAF SPOT Ohio Rank[c]	SEPTORIA LEAF SPOT Ind. Rank[c]	ALTERNARIA LEAF SPOT Ohio Rank[c]	ALTERNARIA LEAF SPOT Ind. Rank[c]	TOBACCO MOSAIC Ohio Rank[c]	TOBACCO MOSAIC Ind. Rank[d]	BACTERIAL CANKER Healthy No.	BACTERIAL CANKER Dis. No.	BACTERIAL CANKER Dead No.	BACTERIAL SPOT Rank[c]	BACTERIAL WILT Healthy Pct.
Unclassified (Cont.)											
124582		3		3		S				3	0
126815		3		3		S				1	
127798		3		3		S					
129081											
129148							0	4	0		
129691							0	6	0		

c/ Ranked for resistance. 0 = healthy. 3 = susceptibility; H = heterogeneous.
d/ Ranked for resistance. 0 = healthy. S = susceptibility; H = heterogeneous.

UNITED STATES DEPARTMENT OF AGRICULTURE
OFFICE OF THE SECRETARY
Washington, D.C.

Penalty For Private Use To
Avoid Payment Of Postage $300